



From high intellectual ability to genius: Profiles of perfectionism

Desde la alta capacidad intelectual hacia el genio: Perfiles de perfeccionismo

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ABSTRACT

The aim of the study was to understand the components associated with the types of perfectionism described as adaptive/healthy, maladaptive/unhealthy or non-perfectionism, which could offer positive or negative aspects to improve excellence and welfare, exploring the number and content of the latent perfectionism structure as a multidimensional construct in a sample of High Intellectual Abilities (HIA) students. Links with Positive and Negative perfectionism were also compared across perfectionism latent profiles. A total of $n=137$ HIA students, mean age 13.77 years ($SD=1.99$), participated in a survey. The Almost Perfect Scale Revised (APS-R) and Positive and Negative Perfectionism Scale-12 (PNPS-12) were used. Results obtained showed three latent classes (LC): 'Unhealthy' (LC1), 'Healthy' (LC2) and 'No perfectionism' (LC3). LC1 showed high scores on Discrepancy subscales but low in Order and High Standards. LC2 displayed higher scores on High Standards and Order. LC3 displayed lowest scores across all perfectionism facets. Statistically significant differences were found across latent profile in almost all perfectionism features. Different patterns of associations with Positive and Negative perfectionism were obtained across latent profiles. These findings address the latent structure of perfectionisms in HIA students and allow us to delimit, analyze, and understand the tentative latent profiles within the HIA arena

RESUMEN

El objetivo de este estudio fue comprender los componentes asociados a distintos tipos de perfeccionismo descrito como: adaptativo/sano, mal adaptativo/insano o no perfeccionismo que pueden tener efectos positivos o negativos para el logro de la excelencia. Se exploró el número y contenido de las estructuras latentes del perfeccionismo como constructo multidimensional en una muestra de $n=137$ estudiantes con Altas Capacidades Intelectuales (ACI) con una media de edad de 13,77 años ($DT=1,99$). La conexión con el perfeccionismo positivo y negativo se analizó sobre la base de los diferentes perfiles de perfeccionismo. Se utilizaron las escalas «Almost Perfect Scale Revised» (APS-R) y la «Positive and Negative Perfectionism Scale-12». Los resultados mostraron tres clases latentes de perfeccionismo: «No Sano» (CL1), «Sano» (CL2) y «No Perfeccionista» (CL3). La CL1 mostró puntuaciones más altas en las subescalas de Discrepancia y bajas en Orden y Altos Estándares. La CL2 reveló puntuaciones altas en Altos Estándares y Orden. La CL3 mostró bajas puntuaciones en todos los dominios de perfeccionismo. Las diferencias fueron estadísticamente significativas entre las clases latentes en los dominios del perfeccionismo. Asimismo, se encontraron diferentes patrones de asociaciones de las clases latentes con el perfeccionismo Positivo y Negativo. Los resultados encontrados permiten atender a las estructuras latentes de perfeccionismo en estudiantes con ACI, que posibilitan delimitar, analizar y entender posibles perfiles latentes.

KEYWORDS | PALABRAS CLAVE

High intellectual ability, gifted students, talented students, perfectionism, cognitive processes, mental development, excellence, digital era.

Alta capacidad intelectual, estudiantes superdotados, estudiantes talentosos, perfeccionismo, procesos cognitivos, desarrollo mental, excelencia, era digital.



1. Introduction

High Intellectual Ability (HIA) is not a static attribute but the result of the expression of a neurobiological high potential for intellectual abilities, modulated by intra and interpersonal variables through the developmental trajectory, from infancy to adulthood (Olzewski-Kubilius, Subotnik, & Worrell, 2015). One of the intrapersonal variables that could influence the expression from the initial High potential to the adult eminence (or genius) is perfectionism.

Perfectionism is a multidimensional construct related to a cognitive control style with high standards of performance and different concerns about committing mistakes (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). The concept of perfectionism has moved from a unidimensional to a multidimensional approach (Leone & Wade, 2017; Shafran, Cooper, & Fairburn, 2002). Thus, the vision of perfectionism is, nowadays, characterized as composed of multiple dimensions with a variety of measures that need to be considered when analyzing the different profiles that can be observed (Flett & al., 2014).

Perfectionism could be considered as a healthy construct with positive outcomes, including higher performance and academic achievement (Damian & al., 2017; Damian, Stoeber, Negru, & B ban, 2014), but it could be associated with anxiety or depressive symptoms (Flett, Besser, & Hewitt, 2014; Roxborough & al., 2012). Hence, efforts are now devoted to gaining a deeper understanding of the many differences in the aspects that articulate each profile of perfectionism (Sastre-Riba, Pérez-Albéniz, & Fonseca-Pedrero, 2016).

Perfectionism is also considered to have a key role in the construction of personality traits and is considered a cognitive pattern. In addition, it has also been related to high intellectual ability as different potentialities that can lead to the achievement of excellence (Pyryt, 2007). Thus, perfectionism in HIA is interpreted as a cognitive style linked to the idea of excellence and performance in academic and different settings, (Damian, Stoeber, Negru-Subtirica, & B ban, 2017; Pyryt, 2007), and well-being.

The study of perfectionism in HIA children and adolescents has received increasing attention due to the fact that some HIA students have shown high standards for achievement, sometimes extreme and impossible to reach, as well as negative reactions to academic failure (Fletcher & Speirs-Neumeister, 2012). Nonetheless, the question about whether perfectionism is higher among children and adolescents with high intellectual abilities is, at this moment, in need of more empirical evidence (Baker, 1996; Parker, Portesová, & Stumpf, 2001) in order to provide better resources to parents, teachers and psychologists associated with the optimization of school performance and its role in the students' digital culture.

Previous studies have supported the idea of a multidimensional manifestation of perfectionism in HIA students with healthy/adaptive and unhealthy/maladaptive consequences (Fletcher & Speirs-Neumeister, 2012). For instance, the study by Parker (2002) revealed three different types of perfectionism in middle-school gifted students by means of the Frost and others' scale (Frost & al., 1990) with students in the healthy/adaptive group scoring lower on neuroticism and higher on extroversion and agreeableness, and students in the unhealthy/maladaptive group scoring higher on neurosis, lower on agreeableness, but also higher on openness to experience, and finally, a third group of non-perfectionists. Other studies have found similar results. (Dixon, Lapsley, & Hanchon, 2004; Hewitt & Flett, 1991; Parker & al., 2001; Rice & Richardson, 2014; Schuler, 2000; Sironic & Reeve, 2015; Slaney, Rice, Mobley, Trippi, & Ashby, 2001; Smith & Saklofske, 2017). For example, Dixon and others (2004), revealed analogous types of perfectionist students in a group of HIA adolescents, next to another group characterized by having negative perfectionism, that included high scores on organization, high standards, and concern for mistakes. This group was related with more psychological symptoms and dysfunctional coping.

Another study proposed three classes of perfectionism after controlling for neuroticism and conscientiousness, described as non-perfectionism, adaptive perfectionism and maladaptive perfectionism (Rice, Richardson, & Tueller, 2014). Recently, these three types of perfectionism were established in different samples of adolescents across the world, (Wang, Puri, Slaney, Methikalam, & Chadha, 2012; Wang, Yuen, & Slaney; Ortega, Wang, Slaney, & Morales, 2014). Other studies, however, propose a 6-class model after applying a latent class analysis of adolescents, where three of them were categorized as perfectionists and were labeled as adaptive perfectionism, non-perfectionism, externally motivated, maladaptive perfectionism, and mixed maladaptive perfectionism, whereas the other three represented non-perfectionism expressions (Sironic & Reeve, 2015).

It is worth noting that across most studies, healthy/adaptive perfectionism is linked with positive effects, excellence, and with higher levels of self-esteem, order and satisfaction in the relation with peers (Pyryt, 2007). On the contrary, unhealthy/maladaptive perfectionism is considered as negative, showing low levels of self-esteem, high levels of

anxiety or discrepancy, whereas levels of well-being of non-perfectionism seem to be in between the two other groups (Wang, Permyakova, & Sheveleva, 2016).

In sum, depending on its composition, perfectionism could have a positive or negative impact, facilitating or inhibiting relevant skills, for instance, problem solving, metacognitive regulation, and excellence. Thus, perfectionism could promote or limit the optimal expression of the initial high intellectual potential and the well-being of these students and, therefore, the scientific, technological, artistic, or social progress in today's digital world.

In order to establish appropriate interventions for the expression of talent, it is necessary to carry out an adequate evaluation of perfectionism in specific target groups, for instance HIA students. Thus, it may be interesting to analyze the typology of perfectionism using new methodological approaches to solve some limitations of previous cluster analyses in this area. With this regard, the latent class analysis (LCA) (dichotomous outcome) or the latent profile analysis (LPA) (continuous outcome) are relatively novel techniques that could enable a better understanding of the groups and profiles of perfectionism.

1.1. Objectives

The general objective was the understanding of the components associated with the types of perfectionism described as adaptive/healthy, maladaptive/unhealthy (Chan, 2007; Costa & al., 2016; Damian & al., 2017; Fletcher & Speirs-Neumeister, 2012; Parker, 2002), or non-perfectionism, which could offer the positive aspects to improve excellence and well-being, as research in HIA literature supports.

Correlation analyses between the PNPS-R and the APS-R showed a significant and positive correlation between Order and High Standards with Positive Perfectionism; on the other hand, a high correlation was obtained between Discrepancy and Negative perfectionism, but not with Positive Perfectionism. In addition, Discrepancy showed a significant correlation with Unhealthy/maladaptive perfectionism, and with Healthy/adaptive perfectionism.

The specific objectives were: a) to capture the latent structure of perfectionism dimensions in HIA children and adolescents; b) to establish associations with Positive and Negative Perfectionism through latent profiles of perfectionism, trying to distinguish the more healthy/adaptive ones to promote the optimal expression of high intellectual potential as a challenge for the digital era.

2. Materials and methods

2.1. Participants

A total of $n=137$ students with a previous professional diagnosis of HIA participated (60.8% male, 39.2% female) in the study. The ages ranged between 12 and 16 years old ($M=13.77$ years old; $SD=1.99$). All of them belonged to the enrichment program at the University of La Rioja.

2.2. Instruments

The measure of perfectionism was obtained applying:

a) The Almost Perfect Scale-Revised (APS-R) (Slaney, Rice, Mobley, Trippi, & Ashby, 2001). The APS-R consists of 23 items to measure adaptive and maladaptive perfectionism. It contains the subscales: 1) High Standards (7 items) which assesses the high standards the individual establishes; 2) Discrepancy subscale (12 items) aims to measure perception of inadequacy about personal standards and achievements; and 3) Order (4 items), related to the preference for neatness and orderliness. A seven-point Likert scale was used (1='Strongly disagree', to 7='Strongly agree'). Previous studies have shown the adequate psychometric properties of the Spanish version with score reliability ranging from .67 (Standards) to .85 (Discrepancy) (Sastre-Riba & al., 2016).

b) The Positive and Negative Perfectionism Scale-12 (PNPS-12) (Chan, 2007; 2010). The PNPS consists of 12 items that intend to measure positive and negative perfectionism. There are two subscales: Positive (students'

realistic striving for excellence; 6 items), and Negative (students' rigid adherence to perfection as well as a preoccupation for avoiding mistakes; 6 items). The PNPS has a five-point Likert scale (1='Strongly disagree', and 5='Strongly agree'). The Spanish adaptation of the PNPS-12 was carried out according to the international regulation regarding test translation (Muñiz, Elosua, & Hambleton, 2013).

2.3. Procedure

A multidimensional intellectual measurement was administered to all HIA participants in the Enrichment program (Sastre-Riba, 2013), in order to amplify and standardize the intellectual profiles. Concretely: a) The Differential Aptitude Test (DAT) (Bennet, Seashore, & Wesman, 2000); and b) Torrance's Test of Creative Thinking (TTCT) (Torrance, 1974). The measurement instruments were administered to groups of no more than 10 students.

According to Castelló & Batlle (1998), participants scoring equal or over the 75th percentile in all the intellectual competencies were classified as gifted; participants with scores equal or above the 90th percentile in at least one or various convergent or divergent aptitudes (but not all) were considered as talented.

Informed written authorization was provided by parents or legal tutors. The confidentiality and the voluntary nature of the study was informed to all participants and parents. Participants did not receive any kind of incentive for their engagement. The researchers supervised the administration of the different tests and questionnaires. The study received the approval of the bioethics committee at the University of La Rioja and it was conducted in line with the principles of the Declaration of Helsinki.

2.4. Data analysis

Different steps were followed for data analysis:

1) Descriptive statistics for the measurements, and the correlation between APS-R and PNPS-12 by means of Pearson's coefficient.

2) Latent profile analysis (LPA) using APS-R subscales, transformed into z scores, was performed to analyse whether there were discrete groups (classes) showing similar profiles. LPA models had to be compared in order to establish the optimal number of classes (i.e., class numbering). First, a 1-class model had to be evaluated. Then latent classes were added till the most suitable class solution was found. Several adjustment indexes, including likelihood ratios were considered to establish the best model. The Akaike Information Criterion (AIC) (Akaike, 1987), the Bayesian Information Criterion (BIC) (Schwarz, 1978), and the sample-size adjusted BIC (ssaBIC) (Sciove, 1987) were analysed to have a better adjustment when lower values were reached. We attended to the Lo-Mendell-Rubin's likelihood ratio test (LRT) (Lo, Mendell, & Rubin, 2001).

The likelihood ratios of the k-1 and k class models examine the null hypothesis of no statistically significant difference. Therefore, a $p < 0.05$ suggests that the k class model provides a more accepted solution model than the k-1 class model. In addition, values of statistical significance ($p > 0.05$) indicate that the solution (k-1) should be favoured with regards to its precision in reflecting the data. Then, it is possible to assess if the number of classes selected is appropriate by means of the bootstrapped parametric likelihood ratio test.

We also tested for the standardized measure of entropy. This value ranges from 0 to 1 and it measures the relative accuracy in participants' classification. A higher value in this parameter reflects that the groups found are more separated (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993).

3) Calculation of the effect of latent class membership on the APS-R and PNPS-12 subscales by means of multivariate analysis of covariance (MANCOVA). Gender and age were used as covariates. Partial eta squared (2) indicated the effect size.

The statistical packages SPSS 22.0 (IBM Corp Released, 2013) and Mplus 7.4 (Muthén and Muthén, 1998-2015) were used.

3. Results

3.1. Descriptive statistics and Pearson correlations

Descriptive statistics of the measures are depicted on Table 1.

As reflected on Table 2, most correlations between APS-R subscales were statistically significant. The positive perfectionism subscale PNPS-12 was associated with Order. The Negative Perfectionism subscale (PNPS-12) was strongly associated with Discrepancy.

3.2. Identification of the latent profiles of perfectionism

Four latent profile solutions were analyzed. The goodness-of-fit values for the different perfectionism models computed are shown in Table 3. The entropy value was <0.90 for the different solutions. The LMR-A p index for the 2-class model revealed that, compared to the 1-class model, there was an improvement that was statistically significant. Then, the comparison between the 2-class and 3-class solutions revealed lower values of AIC, BIC, ssaBIC and, in addition, a marginal significant LMR-A-LRT p-value (0.054) in the case of the 3-class model, indicating, thus, that this solution should be prioritized. The 4-class solution revealed non-significant LMR-A p value and similar AIC, BIC and ssaBIC values than the 3-class model. Thus, we chose the 3-class model as the most suitable one. For class 1, class 2, and class 3, the different average class membership was as follows: 0.928, 0.936, 0.85, and 0.90. These values revealed adequate discrimination.

Following the 3-class model, a 14.59% ($n=20$) was included in class 1 (LC1), class 2 described (LC2) 44.52% ($n=61$), and class 3 (LC3) 40.87% ($n=56$) of the participants. Class 1, named 'Unhealthy perfectionism',

revealed high scores on Discrepancy subscales and low in the rest. Participants in Class 2, identified as 'Healthy perfectionism', displayed higher scores on High

Subscales	1	2	3	4	5
APS-R Standards (1)	1				
APS-R Order (2)	.402**	1			
APS-R Discrepancy (3)	.049	-.06	1		
PNPS Positive (4)	.385**	.609**	-.074	1	
PNPS Negative (5)	.325**	.241**	.383**	.215*	1

** $p<.01$.

Standards and Order. Participants in Class 3 denominated 'Non perfectionism', revealed low scores across all perfectionism components. Figure 1 depicts these three perfectionism profiles.

3.3. Validation of the perfectionism latent profiles

The MANCOVA values indicated a significant effect for group latent profiles [Wilk's $\lambda=0.131$, $F(10, 256)=45.029$; $p<0.001$]. The mean and standard deviation and the p-values and effect sizes for 3-latent profile solution are shown in Table 4.

Attending to the Discrepancy scores, no significant statistical differences across the latent profiles were found. Different configurations of associations with Positive and Negative perfectionism of the PNPS-12 were found. In particular, 'Healthy perfectionism' scored higher, when compared to other latent classes, in High Standards, Order, and Positive Perfectionism.

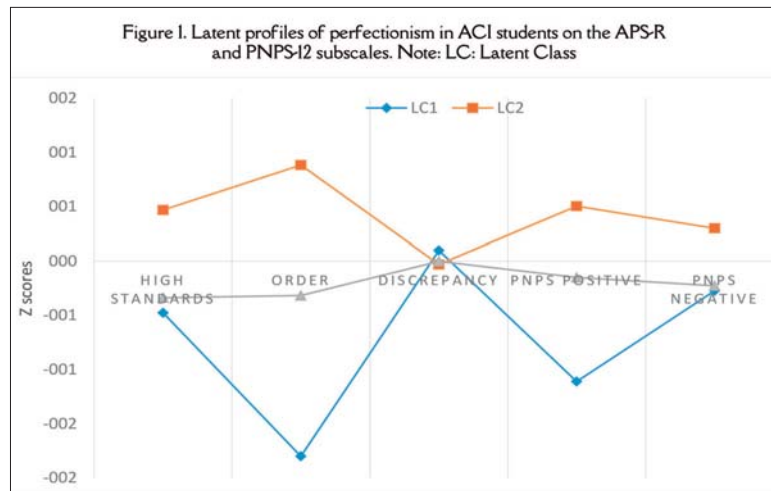
4. Discussion and conclusions

Perfectionism is a multidimensional construct related to the accomplishment of excellence and well-being. Perfectionism is expressed as a continuum (Chan, 2007; Fletcher & Speirs-Neumeister, 2012) of thoughts and

behaviors with positive and negative aspects that are particularly relevant in high intellectual ability students, as they could modu-

Model	Log-likelihood	AIC	BIC	ssaBIC	Entropy	LMR-A	LMR-A p
1	-964.64	1941.29	1958.76	1939.78	-	-	-
2	-567.16	1154.34	1183.54	1151.90	.688	37.167	.029
3	-556.82	1141.64	1182.52	1138.23	.815	19.696	.054
4	-550.73	1147.45	1190.02	1133.07	.826	11.596	.442

Note. AIC=Akaike information criterion; BIC=Bayesian information criterion; ssaBIC=sample-size adjusted BIC; LMR-A=Lo-Mendell-Rubin-adjusted likelihood ratio test.



late the striving for excellence expected in them (Pyryt, 2007).

Beyond the pathological and clinical point of view (Costa, Hausenblas, Oliva, Cuzzocrea, & Larcán, 2016; Donahue, Reilly, Anderson, Schärmer, & Anderson, 2018), this study takes a perspective of perfectionism as a cognitive trait regarded as irrelevant in the high intellectual capacity, trying to differentiate the healthy/adaptive perfectionism from the unhealthy/maladaptive perfectionism. Considering the

relationship between perfectionism, academic and personal achievement goals, and the fact that perfectionism is related to the inhibition or enhancement of different behaviors related to the consecution of these goals, detecting the different types of perfectionism and its components is indicated. This can lead to a better understanding of the student and enable the optimization of their motivation, efforts and executive regulation, preserving their well-being and providing a higher performance in academic settings. This is even more relevant in HIA individuals, where the existence of a high potential does not ensure the consecution of their goals.

Results obtained in the present study, by means of latent cluster analyses, performed applying the APS-R scale, found a three-cluster solution of perfectionism, similar to Frost's model (Frost & al., 1990) or the APS-R. This three-cluster solution is different to the 2 dimensional model (Healthy - Non Healthy) found by Stoeber (2018). Conversely, the results found are similar to Slaney's and others (2001) revealing a three-cluster structure: Cluster 1 (Unhealthy/Maladaptive perfectionism); Cluster 2 (Healthy/Adaptive perfectionism); and Cluster 3 (Non-

Table 4. Mean comparisons across perfectionism classes profiles

	LC1 (Unhealthy)		LC2 (Healthy)		LC3 (No perfectionism)		F	p	Partial η^2	Post hoc comparisons
	M	SD	M	SD	M	SD				
High Standards	-0.48	1.37	0.47	0.84	-0.34	0.78	11.361	<0.001	0.147	1<2, 2>3, 2>1
Order	-1.80	0.42	0.88	0.36	-0.32	0.35	410.062	<0.001	0.861	1<2, 1<3, 2>3
Discrepancy	0.10	0.86	-0.03	1.08	0.00	0.97	0.218	0.804	0.003	No differences
Positive PNPS	-1.11	1.07	0.50	0.74	-0.15	0.86	27.091	<0.001	0.291	1<2, 1<3, 2>3
Negative PNPS	-0.27	1.08	0.30	1.02	-0.23	0.87	5.801	0.004	0.081	1<2, 2>3,

Note. M=Mean; SD=Standard deviation.

Perfectionism). Contrary to Mofield and Parker-Peters (2015), the three clusters are validated, including Cluster 2.

Nevertheless, some differences regarding the scores of clusters' components arise. Cluster 1 (Unhealthy/Maladaptive perfectionism) was defined by high scores on Standards and Discrepancy, and low scores in Order (Parker, 2002; Speirs-Neumeister, 2007), but contrary to other studies (Chan, 2012; Mofield & others, 2015), which show high scores in all components. Cluster 2 (Healthy/Adaptive perfectionism) revealed high scores in Standards and Order but not on Discrepancy, corroborating the results of Chan (2012) and Parker (1997), suggesting that these students could be more adaptive than those of Cluster 1. Cluster 3 (Non perfectionism), similar to previous studies, (Chan, 2007; Chan, 2010) scored lower than the other two groups on all components except on Discrepancy where no statistically significant differences were found. Thus, and considering the absence of significant differences in Discrepancy, this component cannot be considered, attending to the results found in this study, as a differential element of Healthy/adaptive perfectionism or Unhealthy/non adaptive perfectionism, contrary to Chan (2012). Correlation analyses between the PNPS-R and the APS-R showed a significant and positive correlation between Order and High Standards with Positive Perfectionism; on the other hand, a high correlation was obtained between Discrepancy and Negative perfectionism, but not with Positive Perfectionism. In

addition, Discrepancy showed a significant correlation with Unhealthy/maladaptive perfectionism, and with Healthy/adaptive perfectionism.

The results found in the present study could provide relevant insight regarding the need to differentiate the positive from the negative perfectionism, as well as the Healthy/adaptive versus Unhealthy/maladaptive perfectionism in students with HIA (Chan, 2012). The early identification and guidance of HIA students with perfectionism could be essential in order to optimize the striving for excellence and achievement goals as a manifestation of their whole potential. In all, it is necessary to promote Healthy/ Adaptive perfectionism and adult eminence with exceptional products offered by what society calls genius. (Chan, 2012).

The results also enable a deeper understanding of the manifestation of perfectionism in HIA as one of its modulating variables to the expression of genius in adulthood. This could have a relevant impact in parents, educators, and psychologists at schools as the manifestation of perfectionism in HIA is heterogeneous. Some students reveal no perfectionism, others display healthy perfectionism, and, finally, others show an unhealthy manifestation of this psychological construct. Therefore, parents and professionals at school should promote activities and interventions in which the components of healthy perfectionism (high standards and order) can be enhanced. The digital era is generating a new scenario. Children and adolescents are surrounded by stimuli, devices, and activities that generate a new perspective in the development of cognitive skills and the way in which executive functions regulate their cognitive skills. Therefore, research must be done in order to better understand this phenomenon and this new context.

Finally, and considering the key role of motivation for the manifestation of high intellectual potential, more research about the relationship between motivation and perfectionism is needed, in order to promote an optimal expression of the intellectual potential and well-being of HIA students (Fletcher & Speirs-Neumeister, 2012). The consideration of all these aspects will enable better school intervention of HIA students that could lead to the implementation of educational interventions that take into consideration these and other relevant aspects such as digital culture.

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